

REMARKS

This is a response to the Office Action dated December 1, 2004 in which applicant received a notice of Non-Response Amendment. In the Office Action of December 1, 2004, the cancellation of claims 1-49 was acknowledged and the newly submitted claims 50-65 were withdrawn from consideration. Applicant now cancels the withdrawn claims 50-65. Applicant further adds new claims 66-83. Support for the new claims is found in the application as filed and no new matter has been added. The Office Action is discussed below.

New claims 66-83

New claims 66-83 are all drawn to the elected invention. In applicant's Response (dated 12/20/02) applicant elected Group I: claims 1-21, 32-44. Applicant's election of Group I was in response to Examiner's Election/Restrictions requirement dated 7/23/2002.

Independent Claim 66

Independent claim 66 is drawn to the elected invention. Compare to independent claim 17 as originally filed.

Independent Claims 69 and 80Comments:

Page 3 of Office Action dated December 1, 2004 (paper 1104) states:

"The examiner disagrees because the original claim 10 discloses the memory element comprising an electrically contact having no open ends, no dielectric material formed over the interior surface of the cup-shaped contact, and no protrusion(s) extending upward from the rim of the cup-shaped contact..."

It is respectfully noted that applicant in applicant's Response (dated 12/20/02) elected Group I: claims 1-21, 32-44. Referring to the originally filed independent claims 1, 17 and 32, there are no limitations in these claims that prevent the "conductive layer" from having open ends or from being cup-shaped.

In fact, Claim 8 as filed recites:

"The memory element of claim 1, wherein said conductive layer is a conductive liner".

Page 27, lines 14-18, of applicant's specification as filed, recites:

"Examples of conductive liners are shown in Figures 4A-4C. In Figure 4A, the conductive liner 430A is formed in a trench. Figure 4B, the conductive liner 430B formed in a rectangular via hole. Figure 4C is an example of a conductive liner 430C formed in a circular via hole."

Referring to Figures 4A-C, it is seen that all of the conductive liners 430A-C have open ends. Additional support for "open end" is found on page 28, lines 14-20. Conductive

liners 430B and 430C are both cup-shaped. Additional, support for the language "cup-shaped" is found in page 32, line 10 and page 37, line 9 of the application as filed.

Support for "a second dielectric layer disposed on said conductive layer" (claim 69) and "a dielectric material disposed on the interior surface of said cup-shaped contact" (claim 79) is found in Figure 6D of the application as filed. The originally elected claims of Group I do not prohibit such a limitation. Support for "protrusion" (claim 79) is found on page 32, line 18 of the application as filed. Support for "rim" (claim 79) is found on page 29, line 7.

In addition, in the Office Action of December 1, 2004 (paper 1104) Examiner states that "claim 50 is shown by Fig. 3C". It is noted that the original claims 1 and 17 also read on Fig. 3C

The references cited in the Office Action dated April 9, 2003 cites the following references:

- 1) Gonzalez (US 5,854,102)
- 2) Doan (US 6,423,621)
- 3) Ovshinsky (US 5,687,112)
- 4) Ovshinsky (US 5,414,271)

ANALYSIS OF CLAIM 66 WITH REGARD TO CLAIM 66

None of the cited references teach or suggest the limitation of claim 66:

"...said conductive layer having a lateral thickness of less than 500 Angstroms at said upper edge, said raised portion having a lateral thickness of less than 500 Angstroms at said peak and a lateral width of less than 500 Angstroms at said peak..."

Additionally, referring to Figure 2 of Ovshinsky '112

ANALYSIS OF CLAIM 69-80 WITH REGARD TO CITED REFERENCES:

New independent claim 69 recites:

69. (new) An electrically programmable memory element, comprising:

a first dielectric layer having an opening;

a conductive layer disposed on a sidewall surface of said opening;

a second dielectric layer disposed in said opening over said conductive layer;

said conductive layer including a first portion on said sidewall surface and a second portion on said sidewall

surface, the upper surface of said second portion being above the upper surface of said first portion; and

a programmable resistance memory material electrically coupled to said conductive layer.

Gonzalez (US 5,854,102)

Gonzalez (Fig. 8) discloses a memory element that includes plug 38 of polysilicon. Gonzalez fails to teach or suggest the limitations of applicant's claim 68. In particular, Gonzalez does not teach:

...a first dielectric layer having an opening;
a conductive layer disposed on a sidewall surface of said opening;
a second dielectric layer disposed on said conductive layer within said opening...

Doan (US 6,423,621)

Doan (Fig. 14) is directed to a method of forming a memory element wherein the lower electrode includes a tip (114) protruding toward the memory material. However, Doan fails to teach or suggest the limitations of applicant's claim 68. In particular, Doan does not teach:

...a first dielectric layer having an opening;
a conductive layer disposed on a sidewall surface of said opening;
a second dielectric layer disposed on said conductive layer within said opening...

Ovshinsky (US 5,687,112)

Ovshinsky '112 (Figs. 1 and 2) is directed to an electrical contact that tapers to a peak adjacent to a memory material. Ovshinsky '112 also fails to teach or suggest the limitations of applicant's claim 68. In particular, Doan does not teach:

*...a first dielectric layer having an opening;
a conductive layer disposed on a sidewall surface of said opening;
a second dielectric layer disposed on said conductive layer within said opening...*

Ovshinsky (5,414,271)

Ovshinsky '271 (Fig. 1) shows a cup-shaped conductive layer 32,34 having a open end facing away from substrate 16. However, Ovshinsky fails to teach or suggest the limitation *...a second dielectric layer disposed on said conductive layer within said opening..."*

as claimed by applicant in claim 68.

In contrast, Ovshinsky '271 teaches a memory material 36 of chalcogenide deposited over the interior surface of cup-shaped structure formed by layer 32,24 (see column 16, line 42).

In view of the above remarks, each of the references Gonzalez, Doan, Ovshinsky '112 and Ovshinsky '271, either alone or in combination, fails to teach or suggest the limitations of applicant's new independent claim 69.

Claims 70-80 depend from claim 69. Hence, the cited references fail to teach or suggest all of the limitations of any of the dependent claims.

ANALYSIS OF CLAIMS 80-83 WITH REGARDS TO CITED REFERENCES:

New claim 80 recites:

80. (new) An electrically programmable memory element, comprising:

a substrate;

a cup-shaped electrical contact electrically coupled to said substrate, said cup-shaped contact having an open-end facing away from said substrate, said contact including one or more protrusions extending upward from the rim of said cup-shaped contact;

a dielectric material formed over the interior surface of said cup-shaped contact; and

a programmable resistance material electrically coupled to at least one of said protrusions.

Gonzalez (US 5,854,102)

Gonzalez (Fig. 8) discloses a memory element that includes plug 38 of polysilicon. Gonzalez fails to teach or suggest a cup-shaped electrical contact as claims by applicant in claim 80.

Doan (US 6,423,621)

Doan (Fig. 14) is directed to a method of forming a memory element wherein the lower electrode includes a tip (114) protruding toward the memory material. However, Doan fails to teach or suggest a cup-shaped electrical contact as claimed by applicant in claim 80.

Ovshinsky (US 5,687,112)

Ovshinsky '112 (Figs. 1 and 2) is directed to an electrical contact that tapers to a peak adjacent to a memory material. Ovshinsky '112 also fails to teach or suggest a cup-shaped electrical contact as claimed by applicant in claim 80.

Ovshinsky (5,414,271)

Ovshinsky '271 (Fig. 1) shows a cup-shaped conductive layer 32,34 having a open end facing away from substrate 16. However, Ovshinsky fails to teach or suggest the limitation *"...a dielectric material disposed on the interior surface of said cup-shaped contact..."* as claimed by applicant in claim 80.

In contrast, Ovshinsky '271 teaches a memory material 36 of chalcogenide deposited over the interior surface of cup-shaped structure formed by layer 32,24 (see column 16, line 42).

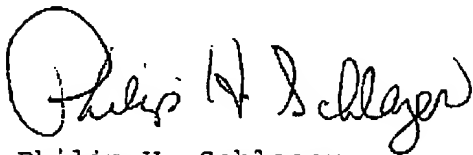
In view of the above remarks, each of the references Gonzalez, Doan, Ovshinsky '112 and Ovshinsky '271, either alone or in combination, fails to teach or suggest the limitations of applicant's new independent claim 80.

Claims 81-83 depend from claim 80. Hence, the cited references fail to teach or suggest all of the limitations of any of the dependent claims.

SUMMARY

Claims 1-65 have been cancelled and claims 66-83 have been added. Applicant respectfully requests reconsideration, withdrawal of the outstanding objections and rejections, and notifications of allowance. Should the Examiner have any questions or suggestions regarding the prosecution of this application, he is asked to contact applicant's representative at the telephone number listed below.

Respectfully submitted,



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Date: February 1, 2005

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